

GAS LAW REVIEW #1

Use the following formulas to solve the next 20 questions. You will need to complete on a separate sheet of paper. Show all work including units or no credit may be given.

$$P_1V_1 = P_2V_2 \quad V_1/T_1 = V_2/T_2 \quad P_1V_1/T_1 = P_2V_2/T_2$$

Boyles Law

1. The volume of the lungs is measured by the volume of air inhaled or exhaled. If the volume of the lungs is 2.400 L during exhalation and the pressure is 101.70 KPa, and the pressure during inhalation is 101.01 KPa, what is the volume of the lungs during inhalation?
2. The total volume of a soda can is 415 mL. Of this 415 mL, there is 60.0 mL of headspace for the CO₂ gas put in to carbonate the beverage. If a volume of 100.0 mL of gas at standard pressure is added to the can, what is the pressure in the can when it has been sealed?
3. It is hard to begin inflating a balloon. A pressure of 800.0 Kpa is required to initially inflate the balloon 225.0 mL. What is the final pressure when the balloon has reached its capacity of 1.2 L?
4. Give a real life example of Boyles law and explain how it is applicable to the relationship between volume and pressure in Boyles law

Charles

5. Solve Charles law for T₂.
6. A 250 cm³ sample of neon is collected at 44.0 °C. Assuming the pressure remains constant, what would be the volume of the neon at standard temperature?
7. A sample of oxygen gas has a volume of 2.73 dm³ at 21.0 °C. At what temperature would the gas have a volume of 4.00 dm³?
8. Give a real life example of Charles law and explain how it is applicable to the relationship between volume and temperature in Charles law

Combined Gas Law

9. Write the combined gas law in equation form. Solve the combined gas law for V₂.
10. A 350 cm³ sample of helium gas is collected at 22.0 °C and 99.3 kPa. What volume would this gas occupy at STP?
11. 73.0 mL of nitrogen at STP is heated to 80.0 °C and the volume increase to 4.53 L. What is the new pressure?
12. A student collects a 3.00 x 10² cm³ sample of hydrogen at 22.0 °C and 91.9 kPa. What volume would the hydrogen occupy at STP?
13. A gas occupied 355 cm³ at a pressure of 99.5 kPa and a temperature of 22 °C. The pressure increases 10 kPa and the temperature drops 7 C°. What is the new volume?

Mixed Review:

14. A gas occupies 560 cm^3 at 285 K . To what temperature must the gas be lowered to, if it is to occupy 25.0 cm^3 ? Assume a constant pressure.
15. If a piston compresses the air in the cylinder to $1/8$ its total volume and the volume is 930 cm^3 at STP, what is the pressure after the gas is compressed?
16. A gas occupied 355 cm^3 at a pressure of 99.5 kPa and a temperature of $22\text{ }^\circ\text{C}$. The pressure increases 10 kPa and the temperature drops $7\text{ }^\circ\text{C}$. What is the new volume?
17. If a gas occupies 733 cm^3 at $10.0\text{ }^\circ\text{C}$, at what temperature will it occupy 950 cm^3 ? Assume that pressure remains constant.
18. A sample of Kr has a volume of 615 cm^3 when its temperature is -44.0°C and its pressure is 112 mm of Hg . What would be the volume of the krypton at STP?
19. If a scuba tank that has a capacity of 10.0 dm^3 is filled with air to 500.0 KPa , what will be the volume of the air at 702.6 KPa ?
20. A sample of argon has a volume of 205 cm^3 when its temperature is -44.0°C and its pressure is 712 mm of Hg . What would be the volume of the argon at STP?

Key:

1. 2.416L
2. 0.16atm
3. 1.48atm
- 4.
5. $T_2 = V_2 T_1 / V_1$
6. 0.215L
7. 430.7K
- 8.
9. $V_2 = P_1 V_1 T_2 / (T_1 P_2)$
10. 0.317L
11. 0.012atm
12. 0.2518L
13. 1.12×10^{-3} L
- 14, 12.7K
15. 7.75atm
16. 0.314L
17. 366.78K
18. 0.107L
19. 7.11L
20. 0.228L